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EXTENDED ABSTRACT

Many scholars have investigated the bidders' behavior in online auctions, including online bidding strategies. Usually they used archival bidding data retrieved from the auction servers to analyze the behavior of the bidders. The information hidden inside the archival data, such as the bidding timing, bidding times, starting price, bid increment, and final price, etc., is objective and several bidding strategies were identified from those data. For example, *ratchet bidding* is identified when some bidders increase the current bid by the minimal bid increment [3] while *jump bidding* when some bidders bid in excess of the minimal necessary increment [5]. *Early bidding* is found when some bidders bid at the early time of an auction [1] while *snipe bidding* or *late bidding* when some bidders bid just before the auction's end [2, 4]. Using a software bidding agent to bid is a strategy called *agent bidding* [7]. These findings from objective archival data have laid the foundation to the research on online bidding strategies.

However, online bidding is like game playing with some psychological elements involved in, which cannot be easily obtained by the objective data. For example, the objective data may show that some bidder's first entry time is late, indicating a snipe bidding strategy was performed near the end of the auction, while he/she actually is using ratchet bidding strategy only at the late stage of an auction. Therefore, this study attempts to investigate online bidding strategies from another perspective. Instead of using objective archival data, this study tries to collect and analyze subjective data through a survey on the proxies of online bidding strategies. We believe that the subjective data can eliminate some biased information and reveal the actual bidding strategies used the bidders, which can help researchers to better understand online bidders' bidding behavior.

A survey was then conducted among the online bidders in Taobao.com because it is the biggest online auction website in China and it owns the most Chinese bidders. In the survey, questions on bidders' perceptions of their bidding frequency, agent bidding frequency, bidding entry time and bid increment were developed and asked in the questionnaire, as the proxies of online bidding strategies. The subjective data were automatically recorded by the online survey.

In order to identify the bidding strategies used by the bidders, this study adopted a two-step cluster analysis method [6]. Based on the four proxies: perceived bidding frequency, perceived agent bidding frequency, perceived bidding entry, and perceived bid increment, we ran the first step. The hierarchical cluster analysis suggested a three-cluster solution. Then we indicated three clusters in the second step of K-mean cluster analysis on the four proxies to identify the details. The results revealed that Cluster 1 has the lowest perceived bid increment and use frequency of agent software; this indicates that these bidders bid manually and as low as possible, suggesting that they opt for ratchet bidding. Cluster 2 has an extremely high perceived agent bidding frequency and bid increment, suggesting that these bidders typically set a very high reservation price to the bidding agent and allow the latter to conduct the bidding for them. It was named as agent jump bidding because it has characteristics of both agent and jump bidding. Meanwhile, Cluster 3 is characterized by perceived late bidding as well as perceived low bidding frequency and bid increment, indicating the bidders perceive themselves enter auctions very late and place very few bids in the auction process. They are identified as snipe bidding strategy.

The three bidding strategies identified in this study, i.e., ratcheting bidding, agent jump bidding and snipe bidding, confirm the research findings in previous research. The reason why agent and jump bidding are combined to one cluster may be due to the special bidding mechanism of Taobao. Whenever you perform a jump bidding and raise the bid by a mount higher than the minimum bid increment, the bidding agent of Taobao will be automatically triggered and it just becomes an agent bidding, which generates the hybrid auction mechanism. In addition, early bidding was not identified in this study although it was found when some researchers analyzed objective archival data [1]. One reason is that Taobao auctions do not have time priority as Yankee auctions do. It is not necessary for bidders to enter the auctions early to get the priority for a tie. The second reason may lie in the characteristics of early bidding itself. Early bidding has been found less effective [1] and satisfactory [4] than other bidding strategies. People may have learned it during years of experience and then choose not to bid too early. As least from the perspective of bidders themselves, most of them believe their entry time is not early.

The research findings can help the researchers and practitioners in this line to understand better the bidding behavior of online bidders. It can also help the auction website owners to design their auctions in a more effective way. For example, they can provide options whether starting bidding agent or not when some bidders perform jump bidding strategy instead of triggering it directly. Some bidders would like to use jump bidding with a huge increase of the bid to show their determination of winning the auction to others. The automation of bidding agent originally designed in Taobao probably lessens the intimidating effect with only a small amount increased. Another insight from this study is that sellers can shorten the duration of their auctions a bit to increase the efficiency since bidders are not active in the early stage.

This study tries to collect and analyze the subjective data from a survey to identify the online bidding strategies. The research results confirm most of the bidding strategies in previous studies, indicating the validation of this method. Moreover,

subjective-data-analysis is supplementary to objective-data-analysis by including more psychological elements that the latter cannot capture easily. More subjective data should be applied in online bidding behavior studies because bidding is a process involving mental activities. For example, some bidder may first use bidding strategy A while drop it half way and switch to bidding strategy B. The actual information of such a bidding process can be more easily obtained from an interview or survey, rather than archival data. In addition, more subjective data can be collected from other auction websites other than Taobao to generalize the research findings.

Keywords: bidding strategy, online auctions, subjective data

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